Drawings

Substitute the appended new sheet 2 with FIG. 2 for the originally filed sheet 2 with FIG. 2.

REMARKS

By the present Amendment, claims 1-6 are cancelled and claims 7-23 are added. This leaves claims 7-23 pending in the application, with claims 7 and 17 being independent.

Drawings

Submitted herewith is a new FIG. 2 correcting the lead line for "18".

The objection to the drawings under 37 C.F.R. § 1.84 (p)(51) is obviated by correcting the description portion of the specification to refer to "68".

Substitute Specification

The specification is revised to avoid the objections raised in the Office Action and to eliminate grammatical and idiomatic errors in the originally presented specification. The number and nature of the changes made in the specification would render it difficult to consider the case and to arrange the papers for printing or copying. Thus, the substitute specification will facilitate processing of the application. The substitute specification includes no "new matter". Pursuant to M.P.E.P. § 608.01(q), voluntarily filed, substitute specifications under these circumstances should normally be accepted. A marked-up copy of the original specification is appended hereto.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Original claims 1-6 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. By the present Amendment, the originally filed claims have been rewritten to avoid the language alleged to be indefinite in the Office Action. All language of the presently pending claims is now believed to have clear antecedent basis and to be clear and definite.

Thus, the pending claims are definite and comply with 35 U.S.C. § 112.

Rejections Under 35 U.S.C. § 103

Claim 7 covers a load suspension device for handling a movable component comprising a load carrying plate 16 and a bracket shaped lifter 34 engageable with a hoist. The load carrying plate extends along a longitudinal axis 14, as opposing first and second longitudinal sides 18 and 20 extending parallel to the longitudinal axis, and has penetration points 30 in the longitudinal sides for passage of at least one fastener 32 for fixing the load carrying plate to a movable component 12. The lifter is coupled by a rotary part 40 to the load carrying plate 16 for swiveling movement back and forth about a swiveling axis 36 and for rotational movement about a rotation axis 38. The rotary part 40 is connected to the load carrying plate on a transverse side 22 thereof such that in a swivel position (as illustrated in FIG. 2) of the lifter, the lifter extends between imaginary extensions 52 if the longitudinal sides.

In this manner, in the swivel position, the lifter is within the parallel planes defined by the first and second sides. Such limited extent of the lifter avoids collisions that may cause damage during handling.

Claims 1-3 and 5 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,443,514 to Fuller, in view of U.S. Patent No. 5,775,664 to Martin. The Fuller patent is cited for the basic construction of the load receiving device, including a load carrying plate 12 and a lifting bracket 14, even though the carrying plate only has a single penetration point 34 and the lifting bracket 14 only pivots about a single axis. The Martin is cited for a lifting means 26 which is pivotable about two perpendicular axes and having multiple penetration points, as allegedly shown in Fig. 7. In support of the rejection, it is contended that it would be obvious to modify the Fuller device by providing the multiple rotational axes and the multiple penetration points of the Martin patent.

Claims 4 and 6 stand rejected under 35 U.S.C. § 103 as being unpatentable over the Fuller and Martin patents, when further considered in view of U.S. Patent No. 5,848,815 to Tsui. The Tsui patent is cited for a hoist ring having a rotary device 12 fixed through a screw section 14 enabling complete rotation through 360 degrees, with the loop ends attached to the rotary part 12 through pins 32 and 33. In support of the rejection, it is contended that it would be obvious to modify the modified Fuller device by using the Tsui pins to attach the Fuller lifting device.

Claim 7 is patentably distinguishable over the Fuller and Martin patents by the rotary part being connected to the load carrying plate on its transverse side such that in the swivel position the lifter extends between imaginary extensions of the first and second sides. Neither the Fuller patent nor the Martin patent individually disclose this feature, and no obvious combination of these two patents would provide this feature.

The Fuller patent relates to a hoist ring 10 comprising a support member 12 and a load bearing ring 14 pivotally mounted to the support member so as to pivot only about a single axis 72. It cannot rotate about a second axis perpendicular to the Fuller pivot axis 72. A threaded post 16 extends through a passage 34 in support 12 so as to extend along an axis 36 perpendicular to ring pivot axis 72. Apparently, the Fuller patent is interpreted such that the axis 72 constitutes a longitudinal axis of the hoist ring, with surfaces 18 and 20 allegedly corresponding to the claimed longitudinal sides.

The Martin patent is cited for an anchor fastening device having a plate member 18, a load ring 26 and a swivel stud 12 connecting load ring 26 to plate 18. The swivel stud allows the ring to swivel without a first axis and to rotate about a second axis perpendicular to the first axis. As illustrated in FIGS. 5-7 of the Martin patent, plate member 18 have different configurations and include threaded apertures 22 for threadedly engaging fasteners. However, each of the

apertures 22 extends along an axis which is parallel to the rotational axis of swivel stud 12 such that the fastener would be within or parallel to any common plane in which the swiveling axis and rotation axis extend. As clearly illustrated in FIG. 4, the ring 26 extends beyond the lateral or longitudinal side of the plate member 18 alleged to correspond to the claimed load carrying plate.

Additionally, the Fuller and Martin patents relate to non-analogous subject matter such that it would not be obvious to combine these two patents in the manner proposed in the rejection. The Fuller patent relates to a structure for connecting a ring to a load member such that the load member can be lifted and manipulated. In contrast, the Martin patent relates to a fastening device for anchoring a load and not for lifting and manipulating a load. In view of the different uses and purposes of the Fuller and Martin devices, it would not be obvious to one of ordinary skill in the art to combine them, particularly in the manner proposed in the Office Action.

In view of the foregoing claim 7 is patentably distinguishable over the cited patents. None of the other cited patents cure these deficiencies in the Fuller and Martin patents.

Claims 8-16, being dependent on claim 7, are also allowable for the above reasons. Moreover, these dependent claims recite additional features further distinguishing them over the cited patents.

Claim 8 is further distinguished by the penetration points extending through the longitudinal sides adjacent its longitudinal ends and using two screws. In contrast, the Fuller patent only discloses a single screw passing through the center of its support 12 and not adjacent to its ends. While the Martin patent uses a number of threaded apertures, the threaded apertures are in a completely different orientation from that in the Fuller patent such that it would not be

obvious to use the Martin threaded apertures 22 in the Fuller device in place of the single passage 34.

Claim 9 is further distinguished by the covering parts, particularly within the overall claimed combination.

Claim 10 is further distinguished by the screw coupling the rotary part to the load carrying plate, which screw extends from a transverse side of the plate with the rotary part extending over the transverse side. Relative to this feature, the Tsui patent is additionally cited. However, the proposed rejection involves the modification (in view of the Tsui patent) of the modifying reference (the Martin patent). This multi-level modification is an indication of non-obviousness of the claimed invention. Additionally, the Tsui hoist ring does not have the other features recited in the combination of claim 10 with claim 7.

Claim 11 is further distinguished by the rotary part extending over the transverse side to limit the swiveling movement , particularly within the overall claimed combination.

Claim 12 is further distinguished by the specific form of the lifter, particularly within the overall claimed combination.

Claim 13 is further distinguished by the fastener extending perpendicularly to the common plane of the swiveling axis and rotation axis. As noted above, the Fuller patent does not have a rotation axis. The Martin has its fastener in the same plane or parallel to the plane of the swiveling axis and rotation axis. Since neither patent discloses this feature, such feature is not obvious based on a combination of the two patents.

Claim 14 is further distinguished for reasons similar to those advanced above relative to claim 13.

Claims 15 and 16 are further distinguished by the rotary part being mounted exteriorly of the load receiving plate coupled to a member projecting from the load receiving plate for rotation about the rotation axis. The Fuller patent has no rotation axis. In the Martin patent, the rotation part 16 is recessed within the plate 18 and is not mounted exteriorly of the plate 16 on a member projecting from the support member 18. The Tsui patent does not disclose any load carrying plate from which a member could project to support a rotary part.

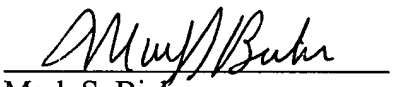
Claim 17 covers a load suspension device for handling a movable component comprising a load carrying plate 16 and a bracket shaped lifter 34 engageable with a hoist. The plate 16 extends along a longitudinal axis 14, has opposing first and second longitudinal sides extending parallel to the longitudinal axis and has penetrating points 30 in the longitudinal sides for passage of fasteners for fixing the load carrying plate on the moveable component. The lifter 34 is coupled by a rotary part 40 to the load carrying plate 16 for swiveling movement back and forth about a swiveling axis 36 and for rotational movement about a rotation axis 38 relative to the load carrying plate. The swiveling axis extends transversely relative to the rotation axis. The rotary part is connected to the load carrying plate on its transverse side. The swiveling axis and the rotation axis extend in a common plane with the fasteners extending perpendicular to that common plane.

For the reasons noted above, such arrangement, particularly of the fasteners being transverse to the common plane is not disclosed or rendered obvious by the cited patents.

Claims 18-23, being dependent upon claim 17, are also allowable for the above reasons. Moreover, these claims are further distinguished for the reasons advanced above relative to claims 15, 8, 9, 10, 11 and 12, respectively. Such reasons are not repeated to avoid burdening of the record.

In view of the foregoing, claims 7-23 are allowable. Prompt and favorable action is solicited.

Respectfully submitted,



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[continued on next page]

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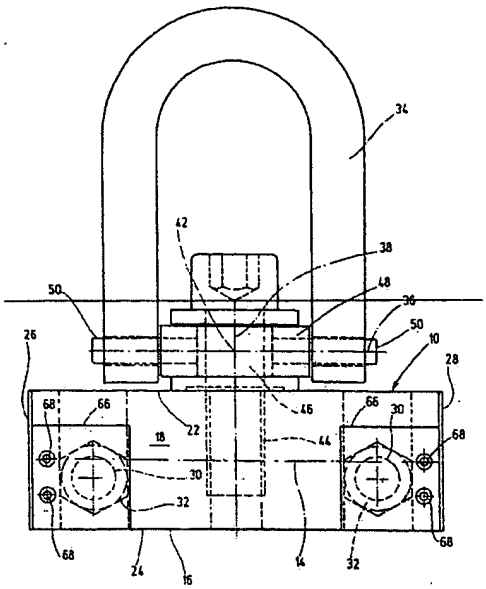
Patent Application

of

MICHAEL KOCH

for

LOAD-RECEIVING DEVICE



(57) Abstract: The invention relates to a load-receiving device, particularly a stop point (10) for handling movable parts such as tower segments of a wind power station. Said load-receiving device comprises a load-receiving plate (16) that extends in the direction of a longitudinal axis (14) and is provided with grip-through points (30) which are located along the two opposite longitudinal sides (18) thereof and through which at least one fastening means (32) engages for fixing the load-receiving plate (16) to the movable part. The inventive load-receiving device further comprises a U-shaped hoisting means (34) that engages with a hoisting mechanism and can be swiveled back and forth about a first axis (pivot axis 36) while being mounted so as to be rotatable relative to the load-receiving plate (16) about a second axis (axis of rotation 38) running perpendicular to the first axis (36) by means of a rotating part (40) which is connected to the load-receiving plate (16). The rotating part (40) is disposed on a transversal side (22) of the load-receiving plate (16) while the hoisting means (34) runs within an imaginary extension of the two longitudinal sides (18) of the load-receiving plate (16) when said hoisting means (34) is in a swiveled position such that as opposed to prior art the retaining bracket with the rotating part thereof is moved from the area of the longitudinal side to the area of the transversal side of the substantially cuboidal load-receiving plate, allowing potential collision points between the retaining bracket used as a hoisting means, the hoisting mechanism gripping the hoisting means, and the load that is to be moved to be definitely avoided.

TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZW.

(84) Designated States *(for each available type of national industrial property right unless otherwise noted)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, CH, CY, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Reference is made for an explanation of the two letter codes and the other abbreviations to the Guidance Notes on Codes and Abbreviations in the front section of each regular PCT Gazette edition.

~~Load receiving device~~

~~The invention relates to a load receiving device, especially a slinging point for handling movable components, such as for example tower segments of a wind power plant, with a load carrying plate which extends in the longitudinal axis and which along its two opposing longitudinal sides has penetration points for passage of at least one fastening means for fixing the load carrying plate on the movable component, and with a bracket-shaped lifting means which is designed for engagement with a hoist and which~~

Field of the Present Invention

The present invention relates to a load receiving device, especially a slinging point for handling movable components, for example, tower segments of a wind power plant. A load carrying plate extends in the longitudinal axis and, along its two opposing longitudinal sides, has penetration points for passage of at least one fastening means for fixing the load carrying plate on the movable component. A bracket-shaped lifting means is designed for engagement with a hoist, can be swiveled back and forth about a first axis (swiveling axis) and about a second axis (axis of rotation) extending transversely to it, and is pivoted relative to the load carrying plate by a rotary part connected to the load carrying plate.

Background of the Invention

Load suspension devices are commercially readily available in a plurality of embodiments. In the known designs, the pivoting holding bracket, which is connected to the rotary part, as a lifting means for a hoist, such as a load shackle, crane hook or the like, sits on the front of the load carrying plate, and consequently in the center on one of its two opposite longitudinal sides of the carrying plate which is otherwise made more or less cuboidal. With the known approach, the holding bracket can ~~be swiveled~~ swivel back and forth ~~in a first axis (swiveling axis), and in a second axis (axis of rotation) which extends transversely to it and is pivoted relative to the load carrying plate by means of a rotary part which is connected to the load carrying plate.~~

~~The pertinent load suspension devices are commercially readily available in a plurality of embodiments. In the known designs the pivoting holding bracket which is connected to the rotary part, as a lifting means for a hoist, such as a load shackle, crane hook or the like, sits on the front of the load carrying plate and consequently in the center on one of its two opposite longitudinal sides of the carrying plate which is otherwise made more or less cuboidal. With the known approach it is likewise possible to swivel the holding bracket back and forth alongabout~~ its

swiveling axis ~~by~~ through an angle of 180° and around the axis of rotation of the rotary part ~~by~~ through an angle of 360°~~; but in~~ °. In spite of these movement possibilities and degrees of freedom for the holding bracket, collisions of the holding bracket with parts of the load ~~which is~~ to be moved take place especially when heavy loads are moved, as occur particularly in the handling of tower segments for erecting wind power plants~~; on~~. On the one hand, this occurrence is accompanied by damage to the load itself, or damaging bending forces are induced at least in the area of the swiveling axis of the holding bracket due to the ~~aforementioned collision~~collisions.

To solve this problem, to some extent the installation crews of wind power plants have already moved to using load suspension devices which they have fabricated themselves, for example, in the form of carrying plates ~~which are~~ screwed to the end of the respective tower segment and ~~which by means of~~ welded-on brackets to facilitate handling, especially erection of tower segments on site~~; but in these~~. These approaches also, when turning from the vertical to the horizontal and during installation, ~~damage~~ often ~~occurs on~~ cause damage to the components ~~which are to be~~ transported in the form of a tower segment~~; this~~, which damage can entail major repair efforts. Furthermore, for the installation crews it is often very time consuming to attach their own special contrivances on site to the respective tower segment before its erection and to remove it again.

DE 201 21 121 U1 discloses an attachment device for attachment of slinging or lashing means to the items to be transported or lashed, with a fastening element ~~which is~~ formed by a screw and ~~which is~~ used for its fastening to the respective article, with an attachment element for the slinging or lashing means and with a connecting element ~~which connects~~ connecting the fastening element to the attachment element~~, which~~. The attachment element is pivoted around the longitudinal axis of the fastening element on a two-part sleeve which encloses the fastening element over part of its length~~, and which~~. The connecting element has an axial position on the

sleeve ~~which is~~ secured by annular flanges ~~which are~~ located on opposing ends of the cylindrical sleeve~~, the~~. The connecting element, in the area of the annular flanges of the sleeve ~~being~~, is supported on the sleeve by ~~way of~~ one row of roller elements respectively. In the known approach, the annular lifting means which forms the attachment element in all its swivel positions is located outside the sleeve ~~which~~. When penetrated by a screw means, the sleeve is used to fix the attachment device on the slinging and lashing means. ~~Nor can it be precluded here that installation~~ Installation problems can occur when using ~~the~~ this known attachment device in the area of the handling of tower segments.

~~On the basis of this state of the art, the~~ Summary of the Invention

An object of the present invention is to ~~devise~~provide a load suspension device which does not have the ~~above described~~ disadvantages of the prior art and which may be mounted and removed again especially in very rapid succession on the component ~~which is~~ to be handled~~, and which makes it possible mainly~~.

Another object of the present invention is to provide a load suspension device able to move and position the component ~~which is~~ to be handled, ~~such as~~ for example, a tower segment, such that damage to the component itself is reliably avoided. ~~This object is~~

These objects are basically attained by a load suspension device ~~with~~ comprising a rotary part located on the transverse side of the load carrying plate. Also, in the swivel position of the lifting means, the latter extends within an imaginary extension of the two longitudinal sides of the load carrying plate. A holding bracket with its rotary part is displaced from the area of the longitudinal side to the area of the transverse side of the more or less cuboidal load carrying plate. Potential collision sites between the holding bracket as the lifting means, the hoist which itself acts on the lifting means, and the load which is to be moved are reliably avoided. This collision avoidance is also promoted by the geometrical size configuration that in one swiveling

position of the lifting means, the lifting means extends within an imaginary extension of the two longitudinal sides of the load carrying plate. Consequently collision potential between the lifting means and the load carrying plate itself, even under load, is reliably avoided.

In one preferred embodiment of the load suspension device of the present invention, the load carrying plate in the edge area has penetration points. Two fixing screws are used as the fastening means. Their screw heads may be accommodated in depressions of the load carrying plate. With this configuration, a plurality of variously dimensioned tower segments can be handled with their end flanges, on the threaded holes of which the load carrying plate is fixed by fixing screws. Provision is preferably made so that the screw heads of the fixing screws are secured against unintentional loosening by two covering parts which can be securely joined to the parts of the load carrying plate. This greatly increases the safety of installation.

Other objects, advantages and salient features of ~~claim~~the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

Brief Description of the Drawings

Referring to the drawings which form a part of this disclosure:

FIG. 1 is a front elevational view of a load suspension device according to an embodiment of the present invention;

FIG. 2 is a side elevational view of the load suspension device of FIG. 1 ~~in its entirety.~~; and

~~In that, as specified in the characterizing part of claim 1, the rotary part is located on the transverse side of the load carrying plate and in that in the swivel position of the lifting means the latter extends within an imaginary extension of the two longitudinal sides of the load carrying plate, the holding bracket with its rotary part, in contrast to the state of the art, at any rate is displaced from the area of the longitudinal side to the area of the transverse side of the more or less cuboidal load carrying plate, with the result that potential collision sites between the holding bracket as the lifting means, the hoist which itself acts on the lifting means, and the load which is to be moved are reliably avoided. This is also promoted by the fact that it is ensured in any case by the geometrical size configuration that in one swiveling position of the lifting means said lifting means extends within an imaginary extension of the two longitudinal sides of the load carrying plate and consequently collision potential between the lifting means and the load carrying plate itself, even under load, is reliably avoided~~FIG. 3 is a side elevational view in partial section of the load suspension device of FIG. 1 fixed on the end of a tower segment of a wind power plant.

~~In one preferred embodiment of the load suspension device as claimed in the invention, the load carrying plate in the edge area has penetration points, with two fixing screws being used as the fastening means, the screw heads of which may be accommodated in depressions of the load carrying plate. With this configuration a plurality of variously dimensioned tower segments can be handled with their end flanges, on the threaded holes of which the load carrying plate is fixed by way of fixing screws. Provision is preferably made so that the screw heads of the fixing screws are secured against unintentional loosening by two covering parts which can be securely joined to the parts of the load carrying plate. This greatly increases the safety of installation.~~Detailed Description of the Invention

~~Other advantageous embodiments are the features of the other dependent claims.~~

~~Reference will now be made to the~~ FIG. 1 shows a load suspension device ~~as claimed in the invention using one embodiment in accordance with the drawings which are schematic and not to scale.~~

~~FIG. 1 shows a front view of the load suspension device;~~

~~FIG. 2 shows a side face view of the load suspension device as shown in FIG. 1;~~

~~FIG. 3 shows in part in~~ according to an ~~aspect, in part in a section, the load suspension device which is fixed on the end of a tower segment of a wind power plant.~~

~~FIG. 1 shows in a front view the load suspension device~~embodiment of the present invention, especially in the manner of a ~~so-called~~ slinging point 10 for handling of movable components, ~~such as~~ for example, tower segments 12 (shown partially in FIG. 3) of a wind power plant (not shown). The load suspension device ~~as claimed in the invention~~ has a load carrying plate 16 which extends ~~in~~along the longitudinal axis 14. The load carrying plate 16 is made more or less cuboidal ~~and extending along the longitudinal axis 14~~ or in the shape of a rectangular parallelepiped, and has two opposing longitudinal sides 18, 20~~. Furthermore, the~~ extending along longitudinal axis 14. The two longitudinal sides 18, 20 are bordered by four transverse sides 22, 24, 26, and 28 of the ~~cuboidal~~ load carrying plate 16. In the end area of the respective longitudinal side 18, 20 of the load carrying plate 16 ~~there are~~, penetration points 30 are provided in the form of conventional holes ~~which are provided~~ for passage or receiving of each fastening means 32 in the form of a conventional hexagonal bolt. These hexagonal bolts as the fastening means 32 are used to fix the load carrying plate 16 on the component which is to be moved and handled, for example, in the form of the tower segment 12 (compare FIG. 3).

Furthermore, the load carrying plate 16 has a bracket-shaped lifting means 34 as the holding bracket for engaging the hoist of a load lifting crane ~~which is~~ (not detailed), for example, in the form of a mobile crane or the like. The relevant hoist can be formed from a crane hook, but also from a load shackle ~~which is~~ connected to the load gear of the crane and ~~which~~ then ~~fits~~fitting into the holding bracket as the lifting means 34. The pertinent slinging and moving of loads are conventional, so that they will not be detailed here. The holding bracket, as the lifting means 34, can be swiveled back and forth ~~in~~about a first axis (swiveling axis) 36 and, ~~in~~about a second axis ~~which extends~~(axis of rotation) 38 extending transversely to ~~it (axis of rotation) 38, it~~ the first axis 36. It is pivoted relative to the load carrying plate 16 by ~~means of~~ a rotary part 40. As illustrated in FIG. 1, in the illustrated swivel position of the holding bracket ~~shown there~~, the swiveling axis 36 extends parallel to the longitudinal axis 14 of the load carrying plate 16 and the ~~indicated~~rotation axis 38 of rotation ~~rests~~ extends vertically ~~on~~relative to the swiveling axis 36~~, the~~. The pertinent imaginary connecting point 42 ~~being~~of axes 36 and 38 is located outside the load carrying plate and above ~~the~~ its transverse side 22 ~~of the latter~~. Due to the swiveling axis 36, the bracket-shaped lifting means 34 can be swiveled back and forth more or less ~~by~~ through an angle of 180° ~~and the~~ °. The lifting means 34 can be turned ~~by~~ through an angle of 360° around the vertical axis or the axis of rotation 38~~, and the~~. The pertinent rotary adjustment motion can be undertaken optionally in one direction for lack of a stop.

The rotary part 40 is securely connected to the load carrying plate 16 by ~~means of~~ a screw connection 44~~,~~ at least partially penetrating more or less in the center of ~~this screw connection 44 at least partially penetrating~~ the load carrying plate ~~16~~16 and extending from the top of the transverse side 22. In the area of the free end of the screw bolt 46, there is a pivoted rotary sleeve 48~~, into which the~~ of rotary part 40. Two axle pieces extend along the swiveling axis 36 of the lifting means 34 ~~fits on~~, fit the end ~~side which otherwise penetrates~~sides of the rotary sleeve 48 and penetrate the two free ends of the bracket-like lifting means 34 ~~by means of two axle pieces 50~~. As shown particularly in the side view in FIG. 2, the outside circumference of

the rotary ~~axis~~sleeve 48 extends slightly over the two longitudinal sides 18 and 20 of the load carrying plate 16. In the swivel position of the bracket-shaped lifting means 34, which is upright ~~when viewed~~ in ~~the line of sight to~~ FIG. 2, it extends within an imaginary extension 52 of the two longitudinal sides 18, 20 of the load carrying plate 16. Consequently, the possible swiveling motion of the holding bracket 34 around its swiveling axis 36 is limited by the upper transverse side 22 of the load carrying plate 16. Thus, in two axial directions which are perpendicular to one another (swiveling axis 36 and axis of rotation 38) it is possible to freely swivel the bracket-shaped lifting means 34 without collisions occurring with the load carrying plate 16 which can be fixed on the tower segment or with the tower segment 12 itself.

The relevant relationships are shown by ~~way of~~ example in FIG. 3~~, where the~~. The tower segment 12, in the form of a conically extending hollow segment, on the inside of its one free end ~~on the inside~~ has a flange part 54 with a transverse hole 56 through which the respective fastening means 32, in the form of a hexagonal, bolt can fit~~, the~~. The free end of the hexagonal bolt can then be fixed by ~~way of~~ a lock nut 58 with a washer 60 on the flange part 54. In the fixed position ~~which is~~ shown in FIG. 3 ~~then~~, the load carrying plate 16 with its one longitudinal side 18 evenly adjoins the lower free end of the flange part 54. As shown particularly in FIG. 3, the bracket-like lifting means 34 can be freely swiveled around the swiveling axis 36 ~~such that even~~. Even in a completely vertical or horizontal arrangement of the tower segment 12 with its outside circumference, no collisions occur in this respect, even when a corresponding hoist, for example, in the form of a crane hook, the load shackle of load gear or the like, are to act on the lifting means 34. Furthermore, the capacity of rotation around the axis of rotation 38 is preserved for the lifting means 34 so that in this respect oblique equalization is possible.

The flange part 54 of the tower segment 12 is made in the manner of a flange ring and has a plurality of fixing possibilities in the form of transverse holes 56 ~~which have~~ at a definable radial distance from one another. The pertinent geometry can be standardized so that with a

small set of load carrying plates 16 with two fastening means 32 with different spacing all important transport and handling processes can be managed. In this respect, the load suspension device can be designed in the manner of a kit so that with only one component kit all forthcoming transport and handling processes can be managed on site.

As also shown particularly in FIGS. 2 and 3, the load carrying plate 16, in the edge area, is provided with two groove-like depressions 62 in which the screw heads 64 of the fastening means 32 can be accommodated. These recesses 62 can in turn be covered by ~~way of~~ two cover parts 66 which, fixed by ~~way of~~ screws ~~64~~68 on the load carrying plate 16, provide for the screw heads not being able to move unintentionally ~~and in~~. In this way, for the safety-relevant screw connection between the load carrying plate 16 and the flange part 52 is not ~~being~~ able to loosen.

~~It has been shown that two~~Two load suspension devices on the lower end of each tower segment are sufficient to be able to move it reliably, especially to remove the tower segment from the transporter and to set it up at the site of the wind power plant. Since the load application point of the hoist by ~~way of~~ the bracket-like lifting means 34 acts far outside the connecting point 42 of the swiveling axis 36 and the axis of rotation 38 (compare FIG. 1~~)~~), reliable transport is achieved without damage occurring on the tower segment or damaging forces for the actual load suspension device being induced.

Claims

1. A load receiving device, especially a slinging point (10) for handling movable components, such as for example tower segments (12) of a wind power plant, with a load carrying plate (16) which extends in the longitudinal axis (14) and which along its two opposing longitudinal sides (18, 20) has penetration points (30) for passage of at least one fastening means (32) for fixing the load carrying plate (16) on the movable component, and with a bracket-shaped lifting means (34) which is designed for engagement with a hoist and which can be swiveled back and forth in a first axis (swiveling axis 36), and in a second axis (axis of rotation 38) which extends transversely to it, is pivoted relative to the load carrying plate (16) by means of a rotary part (40) which is connected to the load carrying plate (16), characterized in that the rotary part (40) is located on the transverse side (22) of the load carrying plate (16) and that in the swivel position of the lifting means (34) the latter extends within an imaginary extension (52) of the two longitudinal sides (18, 20) of the load carrying plate (16).

2. The load suspension device as claimed in claim 1, wherein the load carrying plate (16) in the edge area has penetration points (30) and wherein as the fastening means (32) two fixing screws are used, with screw heads (64) which can be accommodated in depressions (62) of the load carrying plate (16).

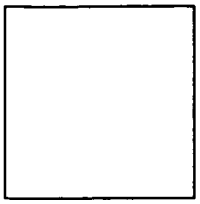
3. The load suspension device as claimed in claim 2, wherein the screw heads (64) of the fixing screws are secured against unintentional loosening by two covering parts (66) which can be securely joined to the parts of the load carrying plate (16).

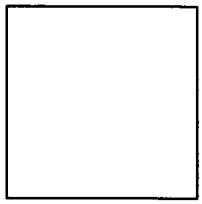
4. The load suspension device as claimed in one of claims 1 to 3, wherein the load carrying plate (16) is made cuboidal, wherein the rotary part (40) is fixed by way of a screw

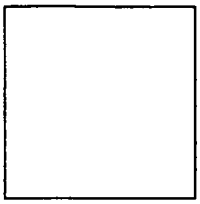
~~section (46) in the load carrying plate (16) on the transverse side (22) and wherein the rotary section (48) sits on this transverse side (22) and enables rotation of the lifting means (34) by 360°.~~

~~5. The load suspension device as claimed in one of claims 1 to 4, wherein the swiveling motion of the lifting means (34) around its swiveling axis (36) is limited by the side surface of the transverse side (22) of the load carrying plate (16).~~

~~6. The load suspension device as claimed in one of claims 1 to 5, wherein the lifting means (34) has two elongated legs, on the respective free end of which the swiveling axis (36) penetrates them and is part of the rotary part (40).~~







While an embodiment has been chosen to illustrate the invention, it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

LOAD-RECEIVING DEVICE

Abstract of the Disclosure

A load-receiving device, particularly a stop point (10) for handling movable parts such as tower segments of a wind power station, includes a load-receiving plate (16) that extends in the direction of a longitudinal axis (14) and is provided with grip-through points (30) located along its two opposite longitudinal sides (18). At least one fastening means (32) is engaged through the points for fixing the load-receiving plate (16) to the movable part. A U-shaped hoist engages with a hoisting mechanism and can be swiveled back and forth about a first axis (pivot axis 36), while being mounted so as to be rotatable relative to the load-receiving plate (16) about a second axis (axis of rotation 38) extending perpendicular to the first axis (36) by a rotating part (40) connected to the load receiving plate (16). The rotating part (40) is disposed on a transversal side (22) of the load-receiving plate (16), while the hoisting means (34) extends within an imaginary extension of the two longitudinal sides (18) of the load-receiving plate (16) when the hoisting means (34) is in a swiveled position. The retaining bracket with the rotating part thereof is moved from the area of the longitudinal side to the area of the transversal side of the substantially cuboidal load-receiving plate, allowing potential collision points between the retaining bracket used as a hoisting means. The hoisting mechanism grips the hoisting means, while the load that is to be moved to be definitely avoided.